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PATENT SPECIFICATION

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COMPLETE SPECIFICATION

Improvements in and relating to Flexible Sealed Containers

I, ANDERS RUBEN RAUSING, of Swedish nationality, of Simontorps Sateri, Blentarp, Sweden, do hereby declare the invention for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to a sealed package of the kind produced through flat-pressing and heat-sealing a tube element along two relatively narrow zones, one at each end of the tube element, for enclosing a filling of material e.g. liquid introduced therein, said tube element comprising an inner seamless thermoplastic tube of substantially uniform wall thickness, and an encircling, longitudinally-seamed body-forming sleeve of equal length and similarly of substantially uniform wall thickness.

British Specification No. 883,562 discloses a package substantially of this kind. Such a package is produced from a tube the outer sleeve body of which comprises a web of paper, cardboard or other suitable packaging material bent into sleeve shape and having its two longitudinal edges joined to each other e.g. by a butt joint imparting a substantially uniform wall thickness to the sleeve. Similarly, the inner plastic tube is of substantially uniform wall thickness and is according to the Specification in question, laminated to the inside surface of the sleeve body.

Although this prior package, due to its continuous plastic lining formed by the plastic tube, and to the substantially uniform wall thickness of the composite tube from which the package is produced is far superior in strength and rigidity to similar packages produced from tubes having plastic linings which are not entirely continuous and/or wall thicknesses which are not uniform along the entire tube periphery, it is, nevertheless, not entirely satisfactory in certain respects. Since the plastic lining is laminated to the inside surface of the body it will be subjected during the package forming operation and during handling of the finished package to the same stresses as the outer body material. In its laminated state the plastic lining, which is thin in order to reduce cost, must, therefore, in absorbing said stresses, participate in the deformation displacement of the body which in many cases tends to cause local ruptures in the plastic lining due to stresses would not be disastrous if applied only to the plastic lining.

A further drawback is that the lamination of the plastic lining to the sleeve body on the inside may cause minor perforations in the plastic lining, if the sleeve inside is of a relatively "raw" texture. This risk is particularly pronounced in cases where the plastic tube is extruded inside the outer sleeve and is applied to the inside surface in a semi-plastic state.

The inconveniences referred to are avoided by the package according to the invention which consists in a sealed package, more especially for holding liquid, of the kind produced through flat-pressing and heat-sealing a tube element along two relatively narrow zones, one at each end of the package, to enclose a charge of filling material introduced therein, said tube element comprising an inner seamless thermoplastic tube of substantially uniform wall thickness, and an encircling longitudinally-seamed body-forming sleeve also of substantially uniform wall thickness wherein the lining formed by the plastic tube length is secured to the inside surface of said body substantially only in said two flat-pressing zones.

As the plastic lining, except at the transverse sealing fins of the package, is loose with respect to the body, it is better suited to resist the stresses set-up during the package forming operation and in the normal handling of the package. The reason is that the stresses even if applied locally will be distributed along the entire free length between

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the fixing points. In this connection is also to be noted the important feature that, in a substantially loose lining, the stress-equalizing property of the filling material may be utilized in a better way. Another important fact is that almost inevitable air will be trapped between body and lining along those portions thereof not secured to each other, said air cushioning or "lubricating" the region of contact between body and lining and, furthermore, to some extent contributing to distribution of stresses, locally applied to the body from outside, over a larger area of the lining.

A further feature of the package according to the invention is that, it may have its plastic lining sealed off at its both ends at a point inwardly offset from the respective transverse joint between body and lining. By this feature there is gained the advantage that the two transverse seals will be released from the seal breaking effect caused by the filling material enclosed in the plastic lining.

The invention also relates to a method of producing the packages in question. Such method is based upon the known process of extruding a plastic tube of substantially uniform wall thickness in a downward direction from an extruder head having an annular extruding nozzle and a central filling-material supply passage. About the tube, from a suitable packaging web material, there is formed a longitudinally seamed sleeve of substantially uniform wall thickness and of an inner diameter substantially corresponding to the outer diameter of the plastic tube, thereby to form a composite tube. To the interior of said composite tube there is supplied a material to be packaged, through the supply passage of the extruder head and, through flat pressing and heat-sealing along narrow zones transverse to the tube axis, the tube is divided into filled and sealed packages finally to be separated from each other by severing cuts in the flat-pressing zones. In accordance with the present invention the extrusion is carried out under such conditions as substantially to avoid adhesion to the sleeve internally to the outer body, the transverse sealing being affected in such a way as simultaneously to make the plastic tube adhere to the sleeve only in the flat-pressing zone.

Because the plastic tube is extruded downwardly into the outer sleeve without adhesion to the inside surface thereof the extrusion of the plastic tube may be carried out in a continuous manner, as necessary, for securing a uniform wall thickness in the plastic tube. The extrusion rate is adapted to the sleeve forming operation so that the plastic tube length extruded during a sleeve dwell period and a sleeve forming period will equal the outer sleeve length obtained during said sleeve forming period.

As for the transverse sealing, measures are

taken for ensuring that in the flat-pressing zones, not only the securing of the plastic tube to the sleeve will be effected but also the sealing-off of the plastic tube. The tube does not necessarily need to be secured to the sleeve using the plastic tube material as an adhesive, but the securing may be carried out as a normal glueing operation using a separate binding agent, preferably pre-applied to the corresponding portion of the sleeve inside.

In any case the sealing-off of the plastic tube is carried out by supplying heat to the sealing zone or region. The sealing heat is transferred by the flat-pressing means, which to this end may be constantly heated; or may carry suitable impulse heating means, e.g. thin directly-heated resistance strips, on their working surface; or may in themselves comprise electrodes of a high frequency heating system. High frequency heating may only be used with plastic materials having adequate dielectric properties.

As mentioned above it may improve the rigidity and tightness of the package to seal off the inner plastic lining at a point inwardly offset from the respective transverse bond between body and lining. In the above method this is effected, in each flat-pressing zone and during the tube dividing operation, by carrying out a transverse sealing operation which only affects the plastic tube on each side of a transverse seal securing the plastic tube to the sleeve, (and also sealing off the plastic tube along the corresponding region thereof).

This separate internal sealing of the plastic lining may be effected by high-frequency dielectric heating, the materials of the outer sleeve and inner lining have been selected to ensure that the main heating is concentrated on the inner plastic tube at the point to be sealed.

When flat-pressing and sealing the composite tube, the uniform wall thickness thereof is of great importance as it makes possible a uniform sealing pressure along the entire sealing zone without necessitating complicated sealing jaw construction. Similarly, the uniform tube wall thickness facilitates the heat supply during the heat sealing operation which is particularly noticeable when using high frequency sealing where electrode surfaces parallel to each other create a high frequency field of the most suitable configuration.

By way of introduction, it was mentioned above that the longitudinal seam of the outer sleeve may be of butt joint type using materials of suitable thickness and other characteristics to impart uniform wall thickness to the sleeve. However, the edges of the web forming the sleeve may alternatively be joined to each other in over-lapping relationship, or even with inside face to inside face, the fin like joint in the latter case being folded to lie against the outside face of the sleeve,

if the corresponding margins have such cross sectional shape that the resulting longitudinal seam will not substantially increase the sleeve wall thickness.

5 In the following description forms of package according to the invention will be described in greater detail, reference being made to the accompanying drawing in which

10 Figure 1, in axial section, illustrates the method according to the invention as applied to the production of pillow-shaped packages, and

15 Figure 2, in axial section, shows the end seal fin and the adjacent portions of the package to the invention in one embodiment thereof.

20 With reference to Figure 1, there is extruded in a downward direction a plastic tube 3 cut out of an extruder head 1 having an annular extruding nozzle 2.

25 About the extruder head a packaging web material, e.g. of paper, is formed into a longitudinally-seamed sleeve 4 surrounding the plastic tube 3, the lower portion of the extruder head 1, together with an outer annulus 5, serving as a sleeve forming means. Above such means there is shown an inner pressure roller 6 and an outer counter pressure roller 7, constituting longitudinally seaming means effecting a joining of the longitudinal margins of the web material into a longitudinal seam in the sleeve 4.

30 The inside surface of the longitudinally seamed sleeve 4 engages the radially outer circumference of the lower portion of the extruder head 1. The plastic extruding nozzle 2 is co-axial with said outer circumference and is arranged to extrude the tube 3 having an outer diameter slightly less than the inner diameter of the surrounding outer sleeve 4.

35 In order to prevent a vacuum in the annular space between the sleeve 4 and the tube 3 from causing the latter to engage the sleeve on the inside while still liable to adhere the outer circumferential surface of the extruder head engaged by the sleeve 4 is provided with grooves 8 parallel to the tube and sleeve axes and by which said annular space communicates with the ambient atmosphere.

40 Centrally in the extruder head 1 and co-axial with the nozzle 2 thereof there is inserted a filling pipe 9 the lower end of which is below the extruder head 1 while its upper end is connected to a source of filling material to be packaged. The outside surface of the filling pipe 9 and the inside of the central passage 10 through which the filling pipe 9 is inserted to extend through the extruder head 1, define an annular channel 11 by means of which the interior of the tube 3 communicates with either the ambient atmosphere or a source of gas for controlling the inner pressure of the tube 3.

45 At a level below the extruder head 1 the composite tube formed by the plastic tube 3 and the sleeve 4 is divided into pillow pack-

ages 12 through flat-pressing and heat-sealing along narrow zones 13 transverse to the tube axis. In the present case the heat-sealing in such zones 13 causes the tube 3 at the sealing zones on one hand to be secured to the inside of the sleeve 4, on the other hand to be sealed off along its inside.

50 In the interval between two successive transverse sealing operations in the zones 13 there is, through the filling pipe 9, supplied a charge of filling material 14 corresponding to the package in question. The supply of filling material may be either intermittent or continuous, the dividing of the composite tube 3, 4 into packages in the latter case necessitating a simultaneous pinching-off of the filling material flow in the interior of the tube 3.

55 In the finished package 12 the lining formed by the plastic tube 3 is secured to the inside of the envelope formed by the sleeve 4 only in the end seal fins 15 formed by severing cuts through the sealing zones 13 between successive packages 12. The lining and the envelope thus may be said to define a gas filled jacket between themselves.

60 Figure 2 illustrates a package according to the invention having its plastic tube 3 sealed off also along a zone 16 inwardly offset from the end seal fin 15 so that portion of the lining corresponding to the cavity 17 is freely "suspended" inside the envelope by two webs 18. The lining 3 may be separately sealed by high-frequency dielectric heating from outside the outer sleeve 4, the material of the lining 3 and web 4 being selected, as regards dielectric properties, as to ensure that the heating is concentrated mainly on the inner plastic tube.

WHAT I CLAIM IS:—

1. A sealed package, more especially for holding liquid, of the kind produced through flat-pressing and heat-sealing a tube element along two relatively narrow zones, one at each end of the package to enclose a charge of filling material introduced therein, said tube element comprising an inner seamless thermoplastic tube of substantially uniform wall thickness, and an encircling longitudinally-seamed body-forming sleeve also of substantially uniform wall thickness, wherein the lining formed by the plastic tube length is secured to the inside surface of said body substantially only in said two flat-pressing zones.

2. A package as claimed in Claim 1, wherein the plastic lining, at the two ends of the package, is sealed off along a zone inwardly offset from the respective transverse bond between lining and body.

3. A method of producing packages as claimed in 1 or 2, comprising extruding in a downward direction a plastic tube of substantially uniform wall thickness from an extruder head having an annular nozzle and a central filling-material supply passage, forming, about the tube and from a suitable web of packaging material, a longitudinally-seamed sleeve being

- of substantially uniform wall thickness and having an inner diameter substantially corresponding to the outer diameter of the plastic tube, thereby to produce a composite tube, supplying, through said central supply passage of the extruder head to the interior of said composite tube, a charge of filling material to be packaged, flat-pressing and heat-sealing the composite tube along narrow zones transverse to the tube axis, thereby to divide the tube into filled and sealed packages, and separating the packages from each other by severing cuts in the flat-pressing zones, wherein the tube extrusion is carried out under such conditions as substantially to avoid adhesion of the tube to the inside surface of the outer sleeve, the transverse sealing securing the tube to the sleeve in the flat-pressing zone.
5. A method as claimed in Claim 3 wherein the sealing-off of the plastic tube is effected through heat-sealing, the securing of the tube to the sleeve being carried out as a glueing operation using a separate adhesive.
6. A method as claimed in any of Claims 3—5 wherein adjacent to each flat-pressing zone there is carried out a transverse sealing of only the plastic tube on each side of the flat-pressing zone at which both the plastic tube and outer tube are sealed.
7. A method of forming and sealing a package of material, substantially as described herein with reference to the accompanying drawings.
8. A sealed package, substantially as described herein with reference to the accompanying drawings.
4. A method as claimed in Claim 3 wherein both the sealing-off of the plastic tube and the securing of the tube to the sleeve are carried out as a heat-sealing operation on the plastic tube.

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COMPLETE SPECIFICATION

1 SHEET

*This drawing is a reproduction of
the Original on a reduced scale*

